# The Box Tube MAC-11

## Part 2

## *Bolt and receiver modifications*

# Practical Scrap Metal Small Arms Vol.5

By Professor Parabellum

**Introduction**

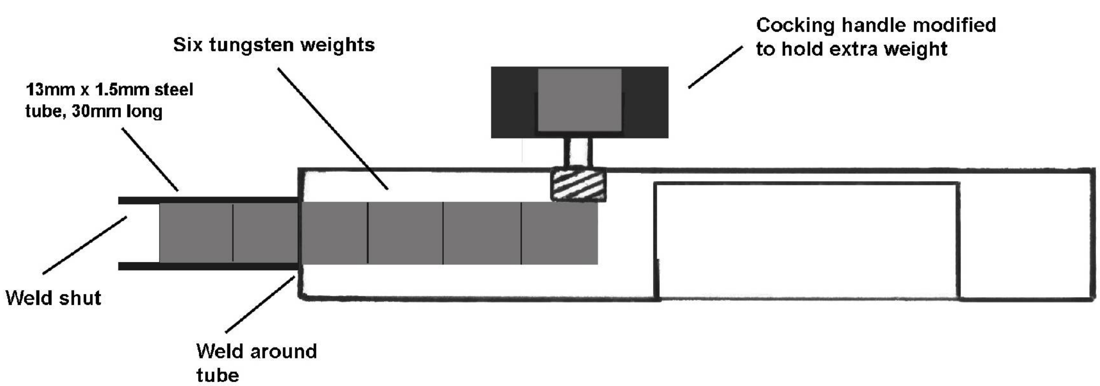
The information and plans contained herein expand upon adding additional bolt weight to the original Box Tube MAC-11 design described in Vol.2 as well as straight forward modifications to the receiver allowing alternative bolts of greater mass to be incorporated without changing the original receiver material specifications.

*For legal purposes, the demonstration prototype shown in both part 1 & 2 of this publication was built as a legal non-firing dummy replica. It's dummy barrel is completely destroyed, blocked and permanently welded in place as well as it's bolt having no provisions for a firing pin.* ***This document is for academic study purposes only.***

**Tungsten inserts**

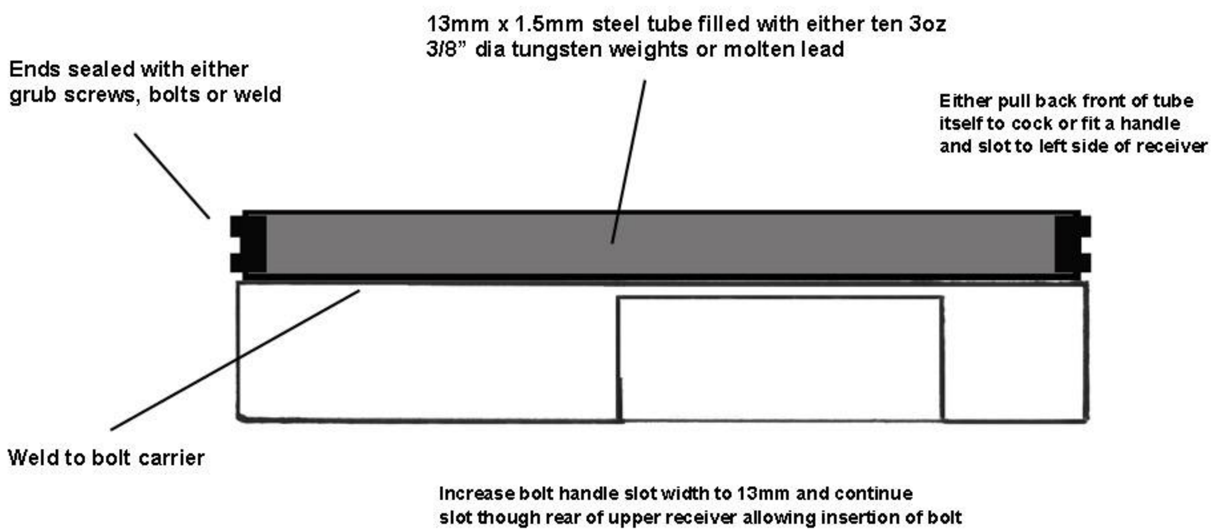
Tungsten is a very dense material, approximately 1.7 times more so than lead. A tungsten weight will weigh nearly twice as much as a lead weight of the same size making it an ideal material to use for bolt inserts. The micro UZI for example uses this method to achieve optimum bolt weight within a very small package. A heavier bolt will also result in a more desirable reduced rate of fire.

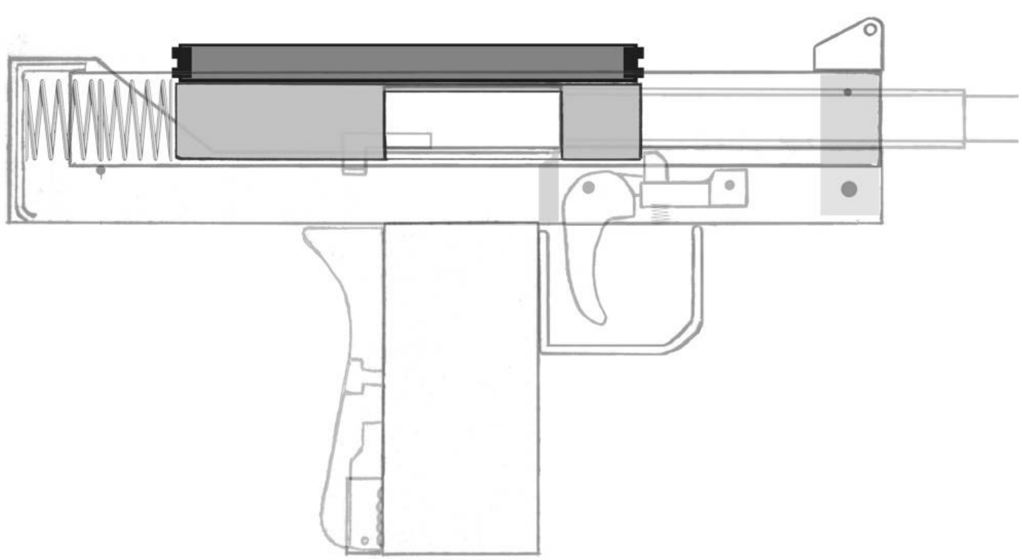
A 3oz (85g) tungsten weight measures 9.5mm x 12mm. Drilling a 3/8" (9.5mm) wide, 48mm long hole in the bolt piece will allow the insertion of four 3 ounce (85g each) weights totalling 340g. When the bolt is cocked all the way back, the hollow middle area of the compressed recoil spring will still allow for 30mm more material to protrude out of the rear of the bolt. Considering this, a further two more weights can be added contained in a welded on piece of 13mm steel tubing. A larger cocking handle can also serve to hold extra weight, especially if made using successive tubing telescoped over it into which additional tungsten weights can be placed. Using this method one can expect to attach almost 600g of tungsten. A bolt made in this manor can potentially weigh over 700g, taking into account the displaced steel. **Keep in mind, the original M11-9 bolt weighs only 440g.**



Even without drilling the bolt for inserts and instead relying on a rear portion containing two 3oz weights and a large cocking handle containing another two 3 oz weights, approximately 550g of overall bolt weight will be achieved. Optionally the recoil spring can also be shortened allowing for a slightly longer bolt with more space to fill with tungsten.

Another simple and highly effective way to attain more weight is to weld on a section of hollow tube on top of the bolt which protrudes through an enlarged cocking handle slot. This tube can be filled with tungsten weights or even enough molten lead to be sufficient. Approximately ten 3oz tungsten weights will fit in a 12mm x1.5mm steel tube the same length as the bolt (5”) allowing potentially 850g of extra weight. Serrations can be made into this piece of tubing allowing it to also serve as a cocking handle. Using lead to fill the tube, a sufficient bolt weight of over 600g will be achieved without any additional inserts. It is important that the recoil spring selected is almost fully compressed when the bolt is cocked back so that the weighted section cannot slam into the top of the lower receiver.



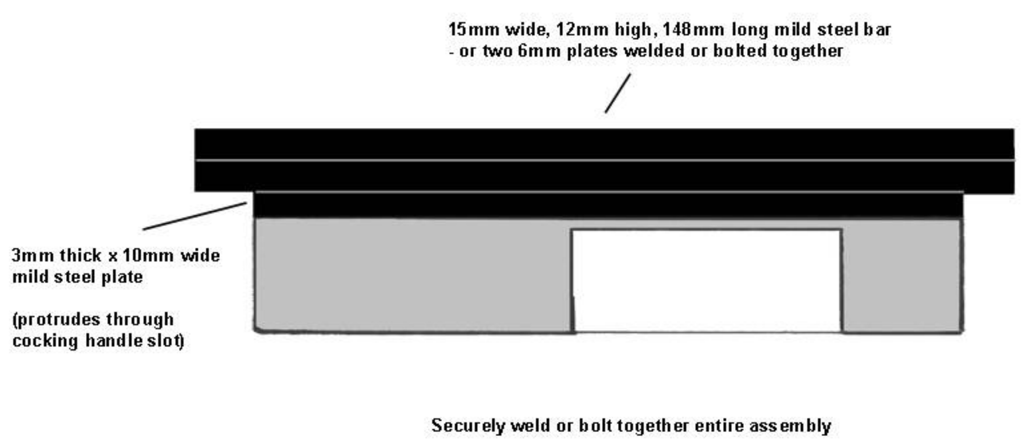



## Submachine guns and their bolt weights

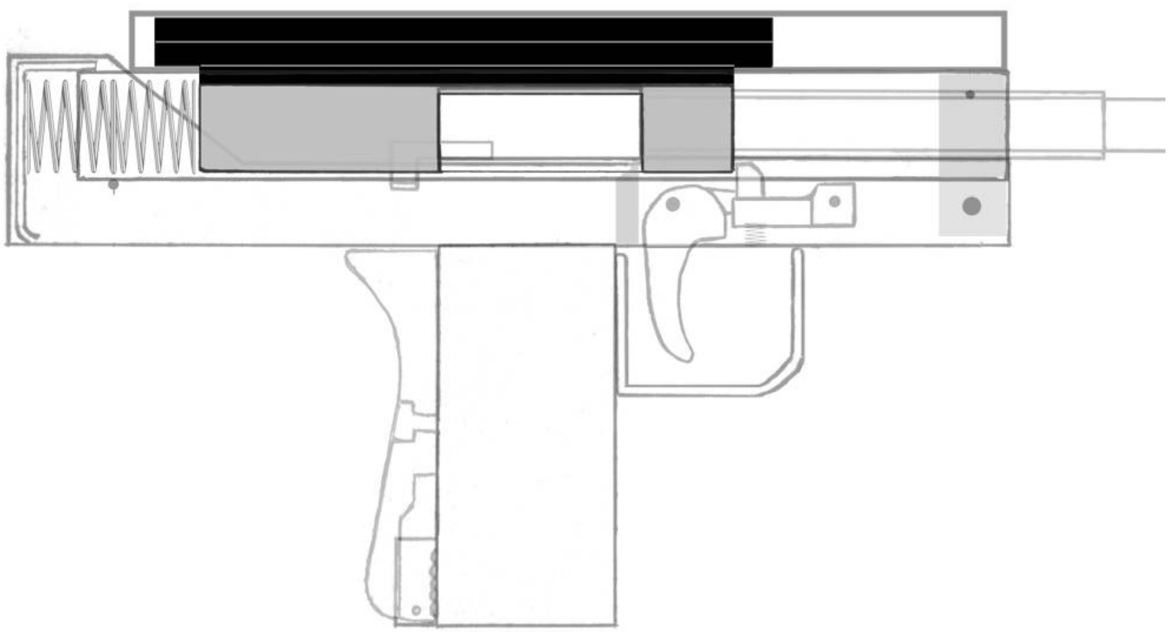
| Submachine gun | Cartridge | Bolt weight |
|---|---|---|
| SWD M11 | 9x19 | 440g |
| STEN MKII | 9x19 | 635g |
| PPS43 | 7.62 x 25 | 560g |
| PPSH41 | 7.62 x 25 | 590g |
| UZI | 9x19 | 680g |
| Lusa | 9x19 | 482g |
| VZ61 | .32 ACP | 230g |
| Micro UZI | 9x19 | 408g |

## All steel bolt method

Though tungsten weights or lead will be preferable and more than sufficient to weight a bolt, an alternative method would be to attach extra mass in the form of two steel plates or a square bar to the bolt. As before, the original cocking handle slot on the receiver is enlarged to allow insertion of the bolt and the handle itself mounted to the side of the receiver instead. An optional housing cover made from a section of square tube will allow for convenient placement of a red-dot or laser sighting system via a Picatinny rail.



*Heightened steel bolt inserted into receiver with added cover:*



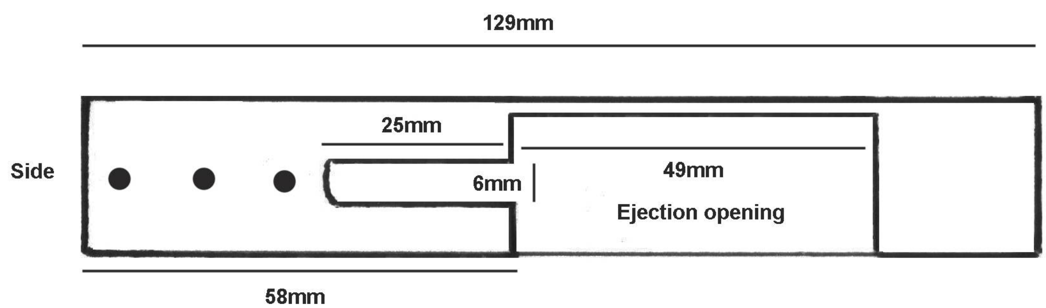
## Plans

Full plans from part 1 are included alongside additional modifications. All pages included should be printed out on 8.5 x 11 US letter paper. Each component template is drawn to scale and can be cut out and glued to their respective thickness of material. Make sure the ruler at the bottom left of each sheet is 2 inches in length. Alternatively, enlarge the plans using a computer program until the ruler is the correct length, then trace the parts needed onto a sheet of paper taped over your computer's screen.

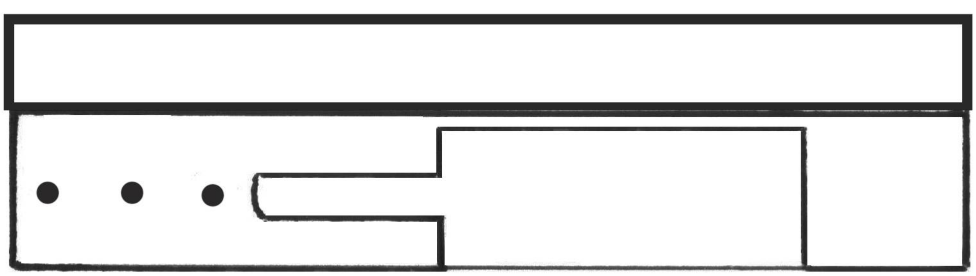
# Weighted bolt 2

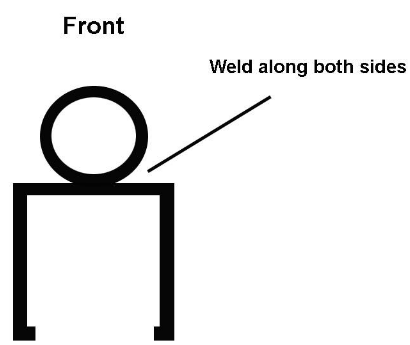
## Bolt carrier

Cut from a 129mm length of 20mm x 20mm (2mm wall) steel box tube
Cut out lower wall



Insert up to ten 3oz 3/4" tungsten weights (9.5 x 12mm) or fill with molten lead
- Thread each end with a 12mm tap for two 12mm grub screws



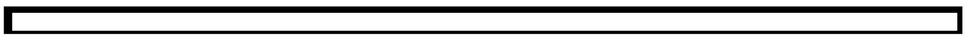



2 inches

Print on 8.5x11 US letter paper

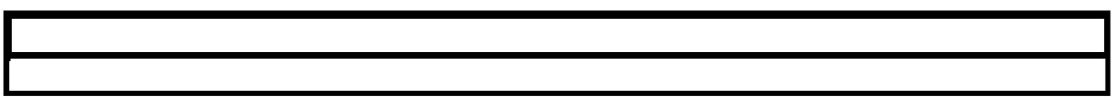
# Weighted bolt 3

Mild steel strip - 3mm thick, 10mm wide, 129mm long

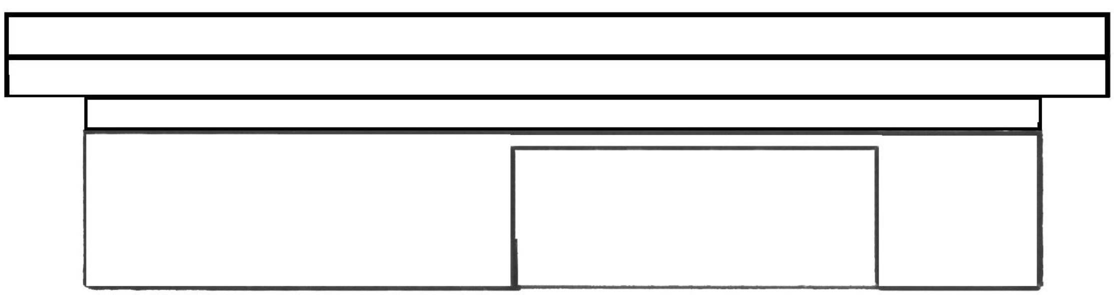


Drill 4 or 5 holes through strip and weld through while ontop of bolt carrier

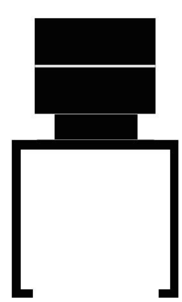
Two 6mm steel plates, 12mm high x 15mm wide, 148mm long
or single 12mm x 15mm steel bar



Weld or secure assembly together using four or five bolts



Front

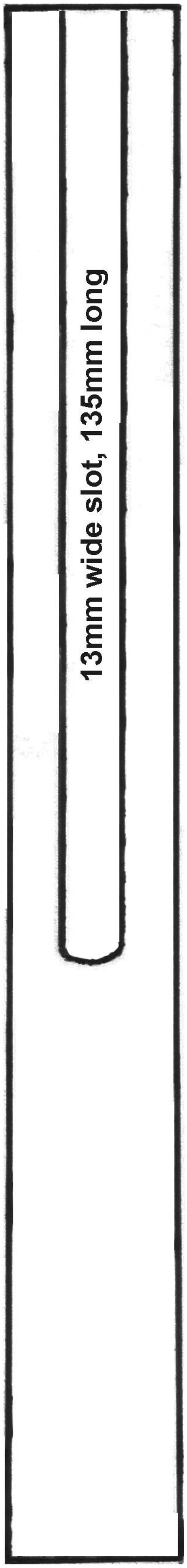


2 inches

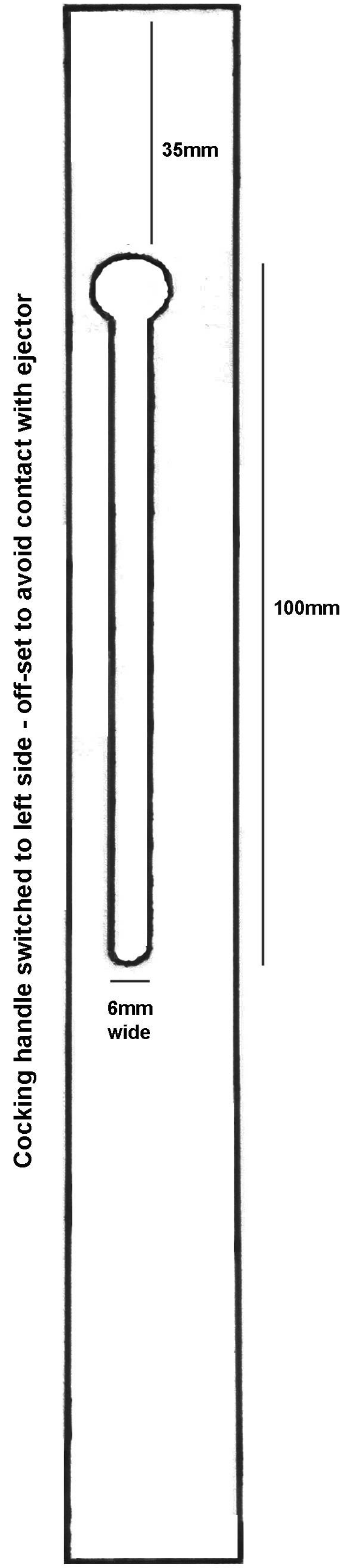
Print on 8.5x11 US letter paper

## Modified upper receiver

### Top



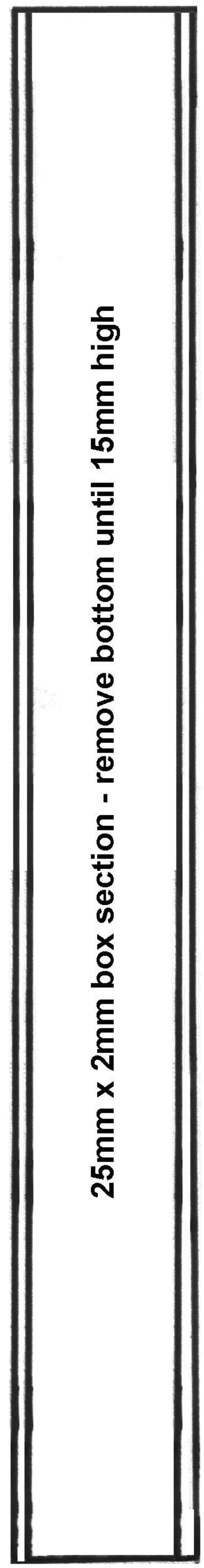

### Left side



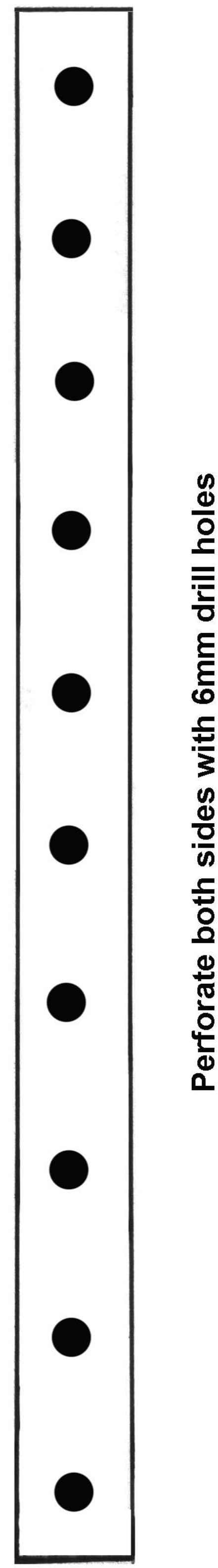

## Bolt cover

Weld to top of upper receiver
- position flush with front

### Bottom




### Side




**2 inches**

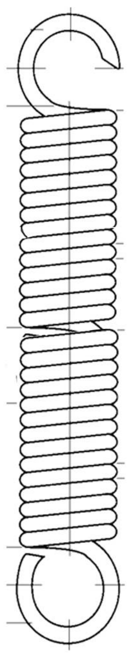
**Print on 8.5x11 US letter paper**

**Upper receiver and bolt cover: 1” (25mm x 25mm) 2mm wall mild steel box section**

# .32 / .380 / 9x18 magazine

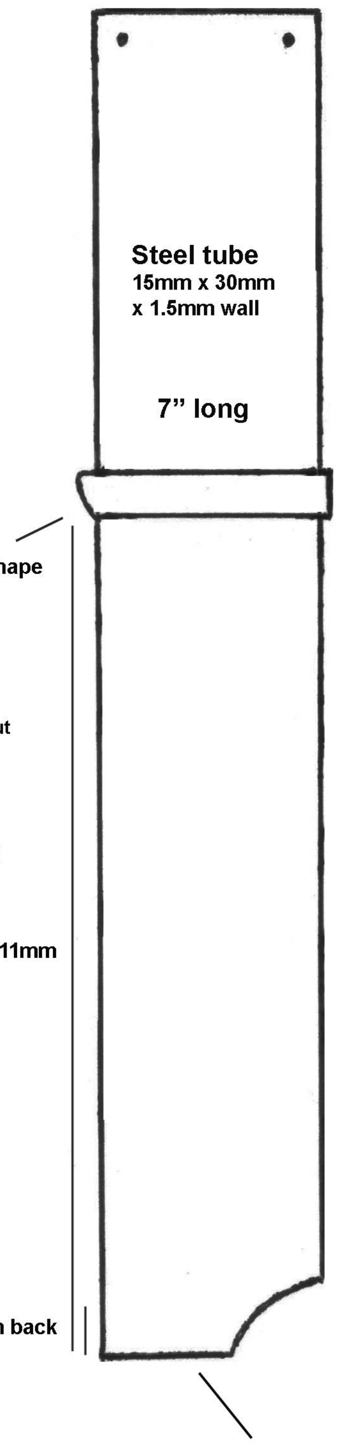
*For display purposes only!*

**Rather than hand winding a magazine spring, a 12mm wide, 2.5” long tension spring can be stretched out to form a very long compression spring suitable for use in such a small ID magazine.**



**Hold both ends using pliers in each hand - stretch out until a consistent compression spring is formed. Snip both ends once complete.**

**A magazine spring produced in this manor will work reliably providing it is used in 30mm x 15mm tube sizes or smaller.**



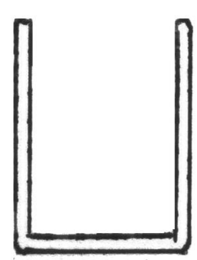

**Base plate - 12mm x 27mm steel strip - secure with two pins**

**Weld or epoxy a 3” long, 4mm thick steel strip to the upper half of the back of the magazine tube to fit in a magazine-well made from 40mm x 20mm x 2mm tube.**

**Bend lips inwards evenly until both tips retain a cartridge - sand edges smooth**

**Follower**

**Bend from 90mm long steel strip 10mm wide x 2mm thick**



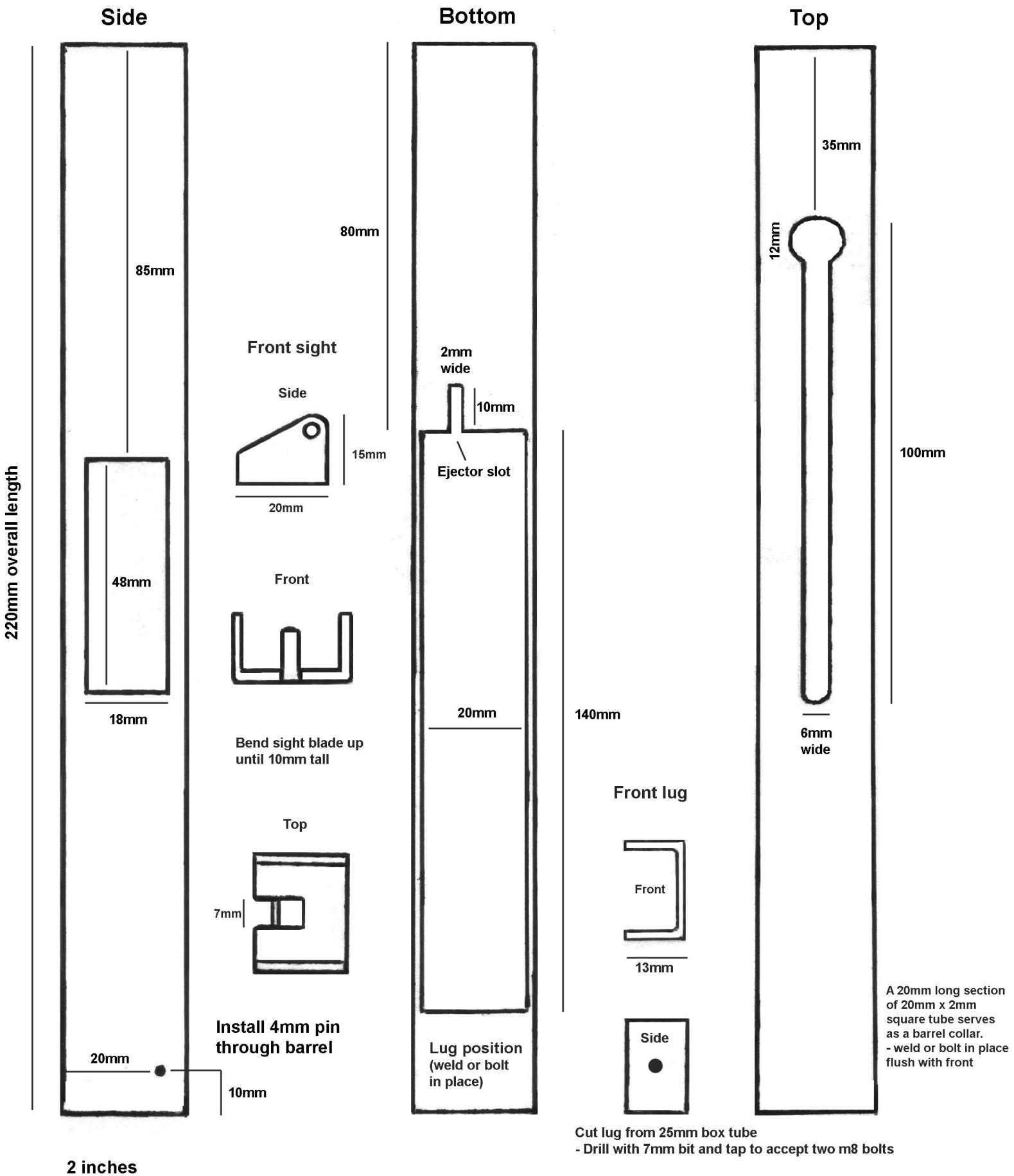
**2 inches**

**Print on 8.5x11 US letter paper**

**Magazine tube : 15mm x 30mm x 1.5mm mild steel tube**
**Follower and base plate : 2mm thick mild steel sheet**

# Upper receiver



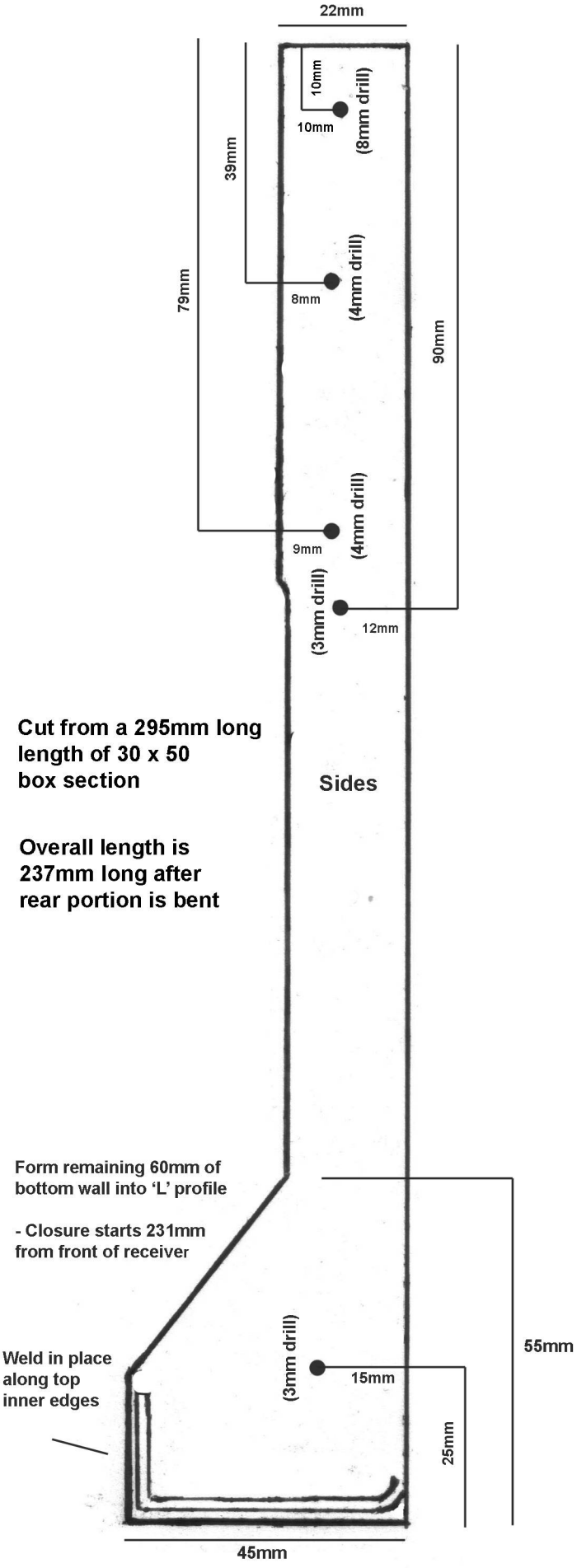



Print on 8.5x11 US letter paper

Upper receiver, lug & front sight: 25mm x 25mm (2mm wall) square mild steel box section

# Lower receiver



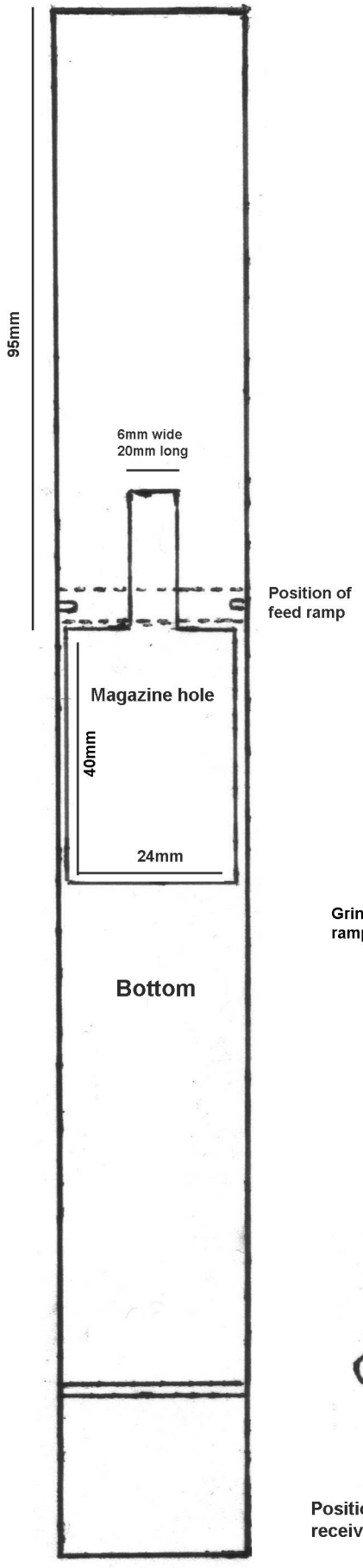



**Cut from a 295mm long length of 30 x 50 box section**

**Overall length is 237mm long after rear portion is bent**

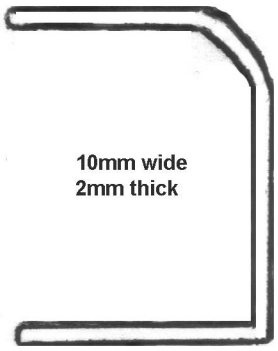
**2 inches**

**Print on 8.5x11 US letter paper**

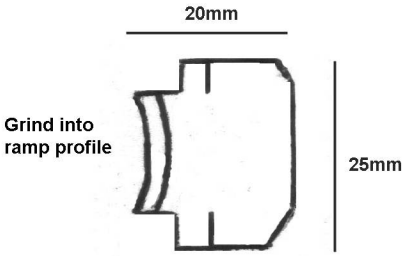



## Trigger guard

Bend from 100mm long steel strip to profile



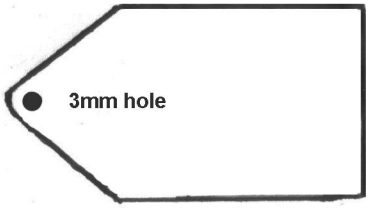

## Feed ramp




Attach to lower receiver using two m3 bolts through both sides

## Rear sight

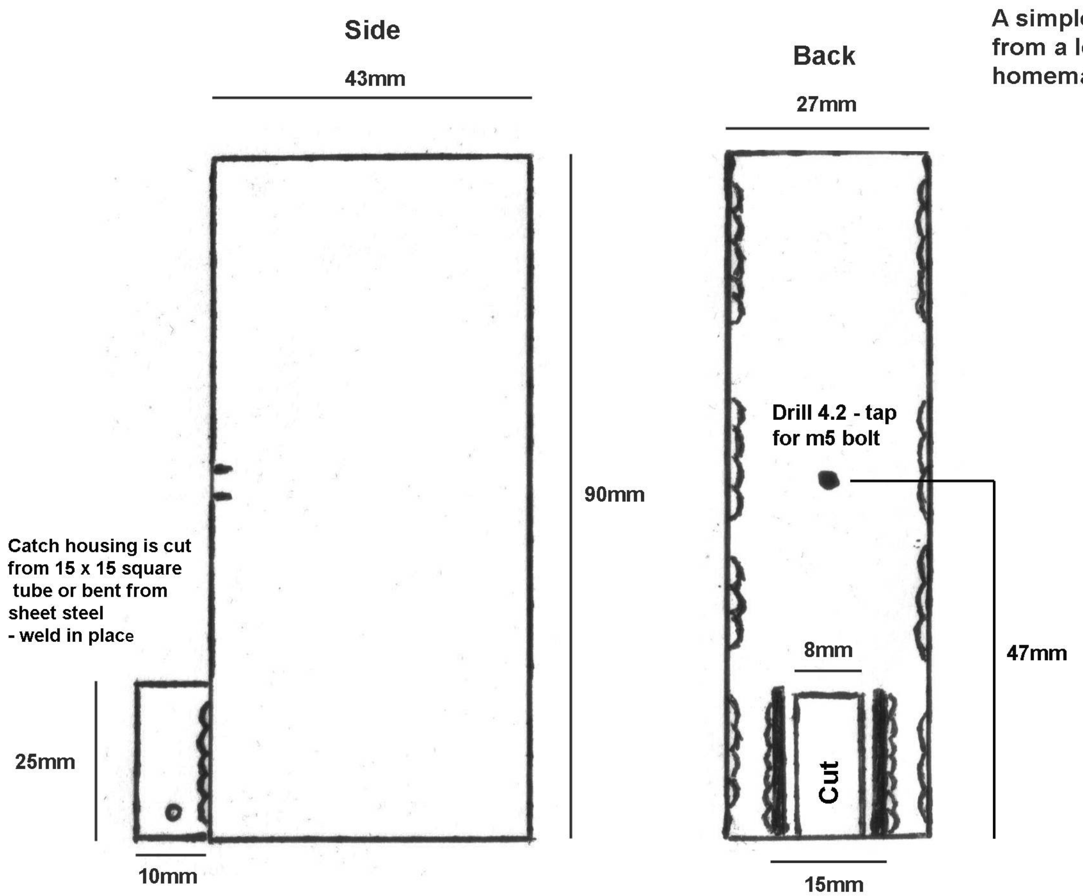
48mm high / 25mm wide



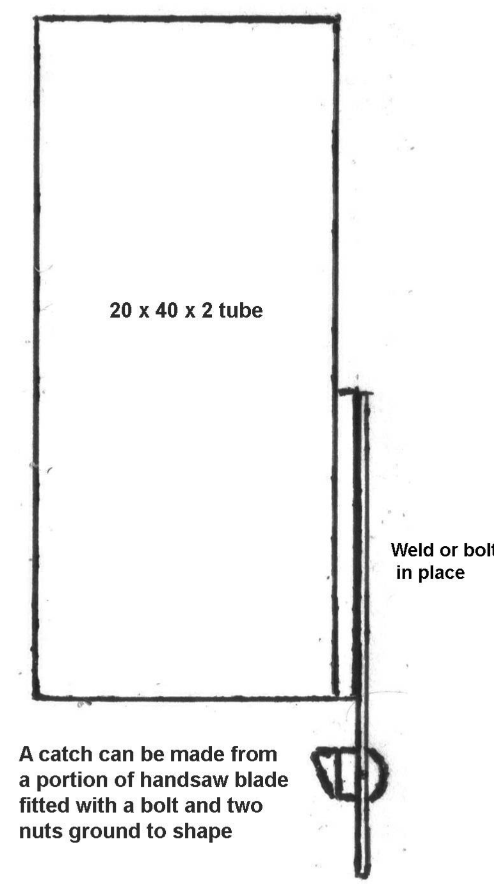

Position sight 15mm up from bottom of lower receiver - weld in place along sides

Lower receiver: 30mm x 50mm (2mm wall) mild steel box section
Rear sight & trigger guard: 14 gauge (2mm) mild steel sheet
Feed ramp: 1/4" (6mm) thick steel or aluminum plate

# Magazine well

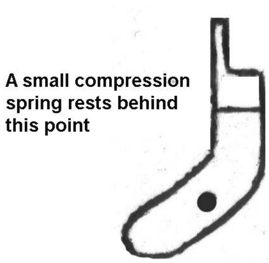



A simpler alternative magazine well can be made from a length of 40 x 20 x 2mm tube to accept a homemade magazine made from 35 x 15 tube




The magazine well is created by removing a 1” side from a length of 1” x 2” steel box section afterwhich it is widened out slightly to accept a sten magazine. The removed portion of wall is then welded back into place to form the correct inner dimension.

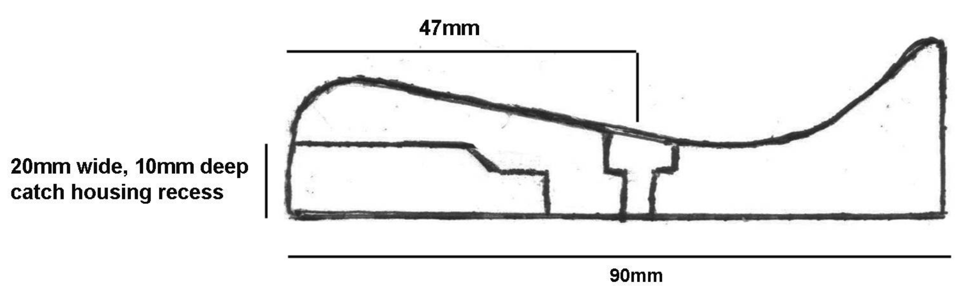
## Mag catch




Secure with 15mm long pin

## Grip

1” thick wood or plastic




**2 inches**

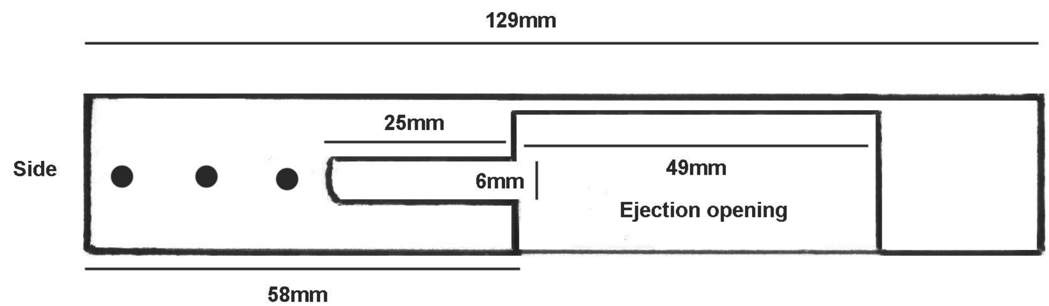
Print on 8.5x11 US letter paper

**Sten magazine well : 1” x 2” (50 x 25 x 1.5mm) steel box section**
**Catch housing : 16 gauge (1.5mm) sheet or suitable steel box section**
**Magazine catch : 3/8” (10mm) steel or aluminum plate**

# Bolt

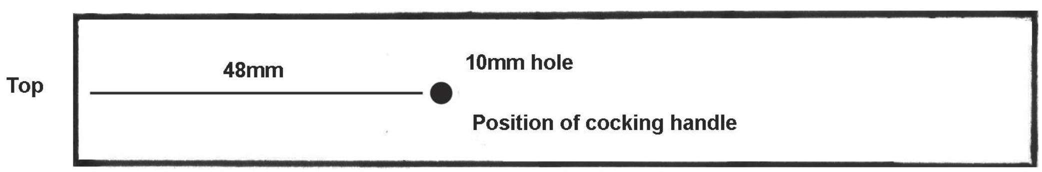
## Bolt carrier

Cut from a 129mm length of 20mm x 20mm (2mm wall) steel box tube
Cut out lower wall



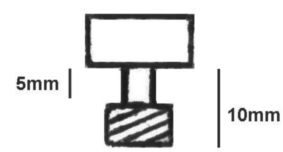

Leave 5mm of lower wall material on front edges to ensure positive contact with sear

Mount bolt piece using three 6mm mild steel bars or weld in place




### Bolt handle

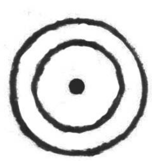
Modifed m10 bolt
(grind down upper 5mm)




Alternatively tap bolt carrier to accept an unmodified m6 bolt

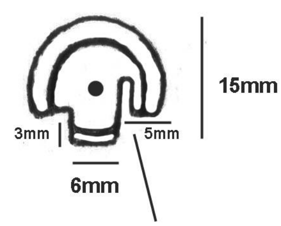
## Bolt piece

Cut from a 58mm length of 5/8” (16mm) steel bar stock



- Drill center with 10mm drill bit until 3mm deep
- Grind flat with 10mm drill bit with tip removed using angle grinder
- Bevel edges slightly with 16mm+ drill bit or dremel

Finished bolt face profile




Grind feeding cuts using angle grinder fitted with 2mm grinding disc for entire 58mm length.

Cut ejection slot using angle grinder fitted with 1mm slitting disc until 7mm deep. Widen if necessary.

## Extractor

Bend from 28mm long strip of 5mm wide steel (2mm thick) to profile below

Rounded edge

**2 inches**

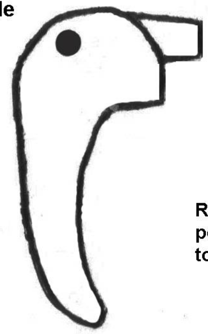
**Print on 8.5x11 US letter paper**

Bolt carrier: 20 x 20 (2mm wall) mild steel square box section
Bolt piece: 5/8” (16mm) round or square mild steel bar stock
Extractor: 14 gauge (2mm) steel sheet

# Trigger group & ejector

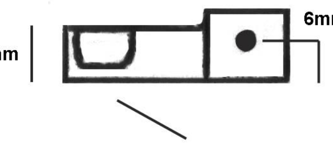
Cut trigger and sear from 10mm thick aluminum or steel plate

## Trigger

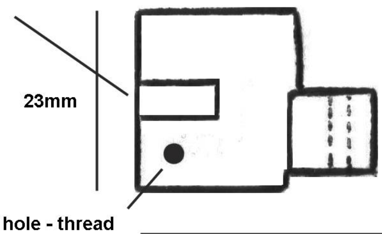



## Sear

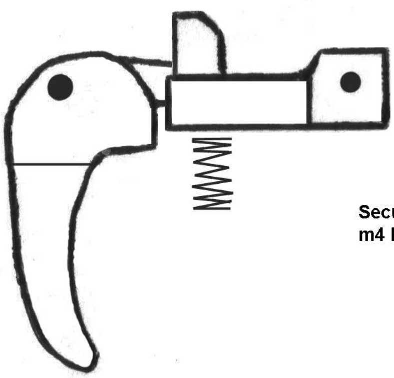
### Side

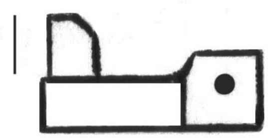



### Top



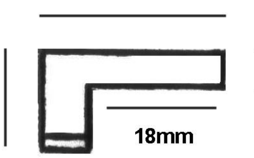

### Finished trigger group



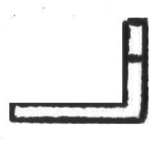




## Ejector

### Side

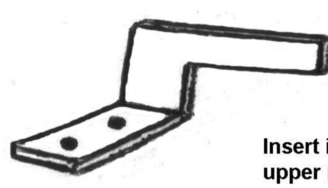



### Front




Bend from 2mm steel sheet

### Finished ejector profile

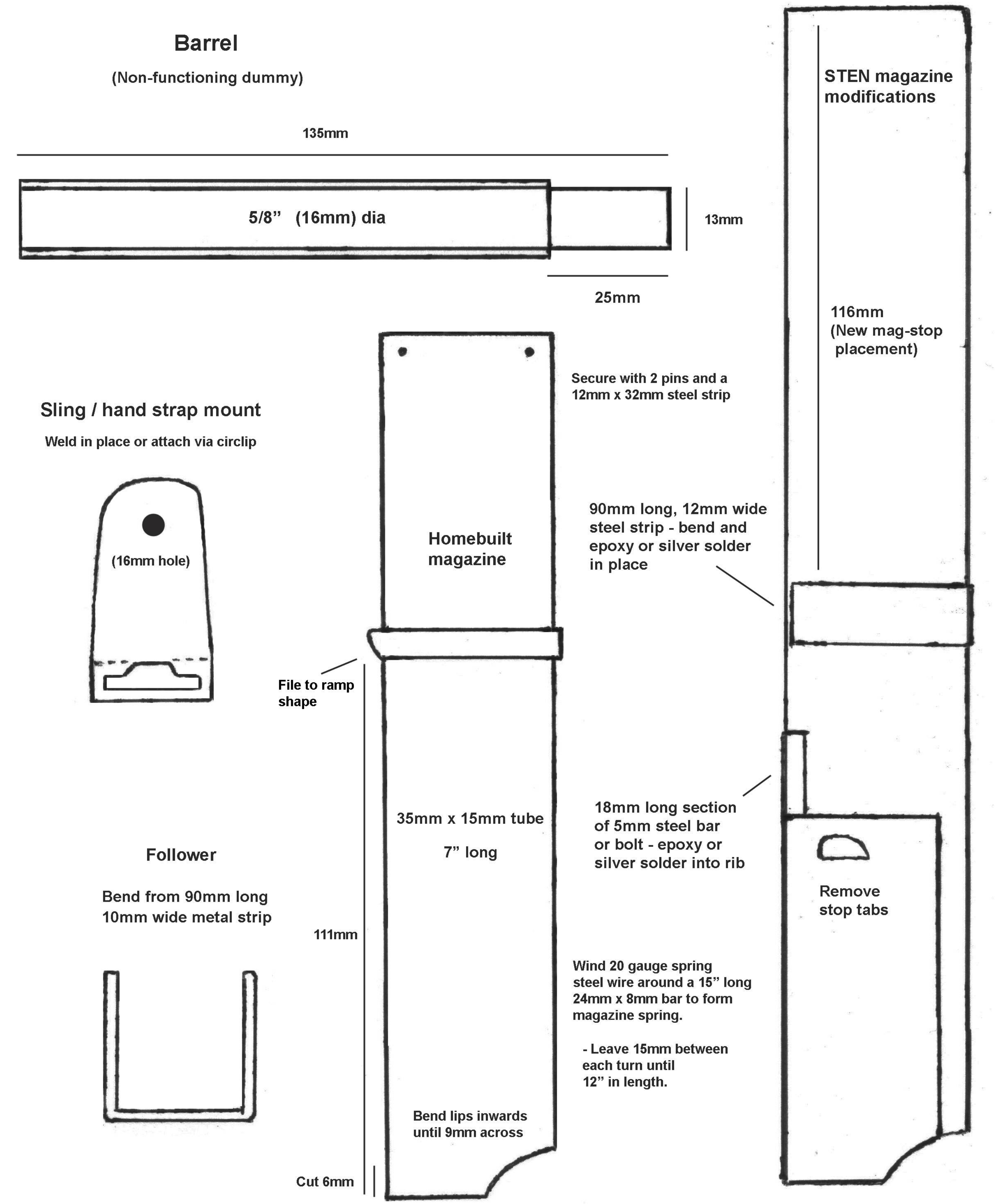



2 inches

Print on 8.5x11 US letter paper

**Trigger and sear: 10mm thick aluminum or steel plate**
**Ejector: 14 gauge (2mm) thick mild steel sheet**

# Barrel and magazine

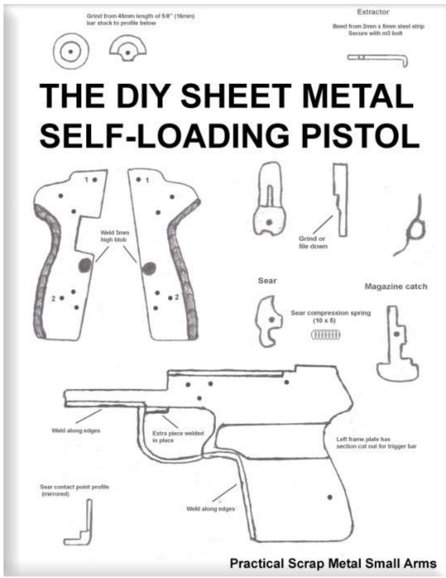


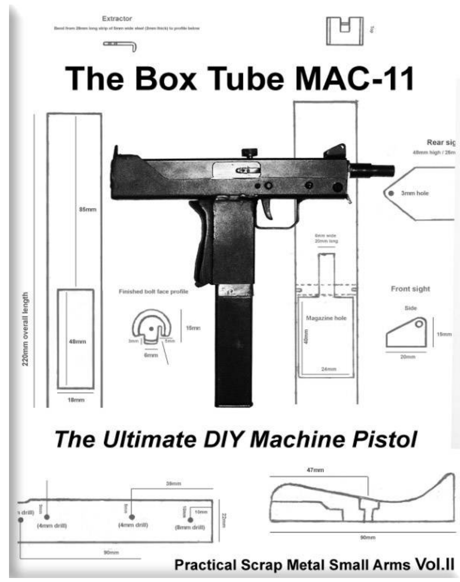

2 inches

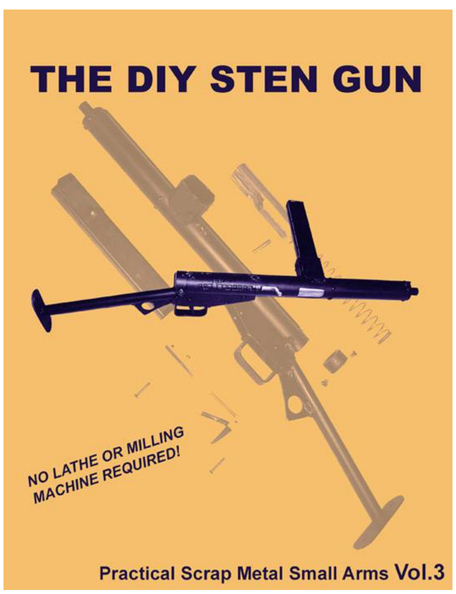
Print on 8.5x11 US letter paper

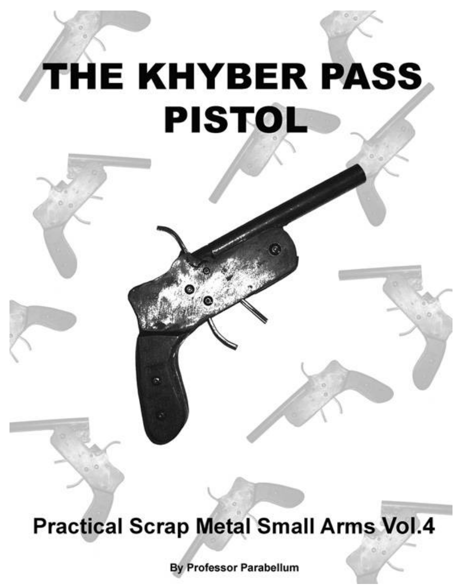
Dummy barrel: 5/8" (16mm) mild steel bar
Sling mount and follower: 14 gauge (2mm) steel sheet

For more...


Extractor
THE DIY SHEET METAL SELF-LOADING PISTOL
Sear
Magazine catch
Practical Scrap Metal Small Arms


Extractor
The Box Tube MAC-11
Front sight
The Ultimate DIY Machine Pistol
Practical Scrap Metal Small Arms Vol.II


THE DIY STEN GUN
NO LATHE OR MILLING MACHINE REQUIRED!
Practical Scrap Metal Small Arms Vol.3


THE KHYBER PASS PISTOL
Practical Scrap Metal Small Arms Vol.4
By Professor Parabellum